

Numerical Investigation of Supersonic Combustion in Axisymmetric Scramjet Engine with Mach 4.5

Halil İbrahim Mungan¹, Belkıs Erzincanlı²

¹Kocaeli University, Kocaeli, Turkey, 205164001@kocaeli.edu.tr

²Gebze Technical University, Kocaeli, Turkey, berzincanli@gtu.edu.tr

Scramjets are the main vehicles for hypersonic flight. Due to its complex physics, researches are carried out to increase scramjet engine efficiency. In this study, supersonic combustion in scramjet engine was investigated. Although scramjet engines have simple design, they have complex combustion phenomena. The goal of this study is to understand this complex flow and its stability. This investigation was conducted with three-dimensional geometry. Ethylene was used for fuel injection with 0.75 mm sonic holes. The investigation was conducted with global reaction mechanism. The cavity flame holder was designed to increase the efficiency of combustion. As a result, it was ensured that the inlet and isolator were designed in accordance with preventing unstart phenomena due to shock-boundary layer interaction in the shock train region. Secondly it was seen that heat addition in near wall region existed much more than the core flow region since the high-enthalpy air had higher momentum than the product species.

Keywords: *Supersonic Combustion, Scramjet, Ethylene Fuel*

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